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pouches." (See p. 15, Bulletin, No. 5, "The Pocket Gophers of the United States)."

The writer has, however, on several occasions in northern Iowa, observed this animal (*Geomys bursarius*), to carry dirt out of its burrow in its cheek pouches, and eject it in exactly the same manner as Dr. Merriam describes their method of emptying their cheek pouches of food, which is as follows: The fore feet are brought back simultaneously along the sides of the head until they had reached a point opposite the hinder end of the pouches; they are then pressed firmly against the head and carried forward. "In this ways the contents of the pouches are promptly dumped in front of the animal." (See p. 19, Monographical Revision of the Pocket Gophers.)

This action of the fore feet is also apparently accompanied by some muscular action of the cheek pouches themselves.

This act of carrying dirt in the cheek pouches, I have personally observed, and several times killed the animal while in the very act, and have with my own hands completed the operation. I am not, however, prepared to say that this is really a constant habit of this species in northern Iowa.

It seems scarcely possible that so high authorities and keen observers as Dr. Merriam and Mr. Bailey should be deceived in their observations of the habits of this species in this respect in the regions they have studied; so we may consider their statements when applied to those regions, as eminently correct.

PHOTOGRAPHING CEDAR BIRDS.

BY DR. R. W. SHUFELDT.

It is now over five years ago since the writer in THE AMERICAN NATURALIST invited the attention of photographers to the value to science of first-class photographs of living animals, taken in natural attitudes, so that they could be used as study-models for artists and taxidermists.[1] Since contributing that article, and during the intervening period, not a little of my time has been spent in perfecting methods by means of which serviceable photographs could be made of the class of subjects just mentioned. Most of these experiments, however, were made last summer, and, upon the whole, with a degree of success far beyond my most sanguine hopes and expectations. From living specimens, and with the animals for the most part life size, in natural attitudes, and with natural surroundings, there have been obtained by me excellent photographic pictures of Opossums; White-footed Mouse (*Peromyscus leucopus*), in the act of jumping; Turkey Buzzard (life size head); nest and two young of *Icteria virens* (life size); also the same of Prairie Wabbler; Indigo Bird; Wood Thrush (*Turdus mustelinus*); Chipping Sparrow; Cat-birds; Red-eyed Vireo; several woodpeckers (mostly life size); various species of bats (life size); many snakes, lizards, hylas and toads; bumble-bee and flowers; and others too numerous to mention. Many of my photographs, too, not in this list, have been published, and appeared in various places.

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[1] SHUFELDT, R. W. Where young amateur photographers can be of assistance to Science. THE AMERICAN NATURALIST, V. XXV, No. 295, Phila., July, 1891, pp. 626–630. Plate XIII, Figure 1.

My success with some of the birds was extremely gratifying, and I have succeeded not only in obtaining many beautiful pictures, but likewise a number that are in my opinion more truthful portraits of their subjects than any of the ordinary illustrations we usually see of them in zoological works and text-books.

Early last summer I had in my possession a pair of living Cedar Birds, and they were most gentle and remarkably tame. One of them is still mine, and is kept in a large cage in order that I may study the moult in that species, which process it is at this writing (October 11, 1896) passing through. During July, I also had a pair of nestling Cedar Birds, at the age they quit the nest. With these, as well as with the adults, I made many photographic studies. In my studio I obtained a fine, life size picture of the male, in a most animated attitude; the pair was also obtained, and were equally satisfactory. Out of doors the operation is far more difficult, and the effort to secure the young was rewarded with but partial success, while in taking the adults under nearly the same conditions, a much better result was obtained. When I say nearly the same conditions, I mean that the young were attempted out in the open, were nothing obstructed the rays of the afternoon sun; while the old birds were tried in a piece of woods, where the light was nicely moderated by the shade of the trees. It is a reproduction (by the half-tone process) of this last picture that I desire to bring before the reader in connection with the present contribution. It was secured in the middle of the forenoon of a bright summer's day, under the following general conditions, to wit: by means of a large sheet of buff-colored blotting-paper the view was cut off beyond a small branch of poplar; this latter was next focused upon, and the camera made steady; next, the pair of birds were allowed to alight upon the limb at that part of it seen upon the camera's ground-glass. With closed shutter, and sensitive plate ready for an exposure, the proper moment must now be intently watched for, and with the pneumatic bulb in your hand, absolutely nothing must distract your attention, if you have any hope of obtaining a picture worthy of the name. Observe the light *most closely;* see to it that there is not a breath of air moving when you are ready to expose; make no sudden movements whatever, or your birds may, and likely will, quit the limb; let them become accustomed to their surroundings; and, finally, let your patience be absolutely inexhaustible. Thus it was I stood when I made the exposure—the male bird quietly assumed the attitude seen in the plate; while the female, with her back towards me, extended her neck to its fullest length (in that peculiar way these birds have), and slightly moved her right wing to avoid the annoyance of a couple of leaves that touched her shoulder. The diaphragm had but an eighth of an inch aperture, and the time was two seconds. One of the most difficult things to control in the out-of-door photography of small, wild animals is the light. It is not only the black, shiny bills of birds and backs of beetles that will take pure white, if they get the full benefit of the sun's rays during the exposure, but many other structures will produce the same undesirable result. Before I had much experience with this tricky factor I met with many disappointments, and ruined upon one occasion nearly an entire box of the best plates in my endeavor to secure a picture of a pair of nestling Pewees (*Contopus virens*) in their nest. In the pictures the birds looked as though they had been *snowed on*. Cutting off the light from above in a later attempt rectified this defect. One good way to study the effect of the light, is upon the ground glass of the camera, when the subject has been carefully focused upon it—and I think it will be found a safe rule in many cases to make the exposure when a light cloud partially veils the sun's face. All such matters, however, can only be gained by experience; and to pass through this, the best of all schooling, one must be pre-armed with an enormous stock of the best kind of patience, with a slight reserve fund of the same article on hand in the event of a run upon the original supply.

The picture of the Cedar Birds taken in this way is reproduced in Plate I, January number of the NATURALIST.

THE BACTERIAL DISEASES OF PLANTS: A CRITICAL REVIEW OF THE PRESENT STATE OF OUR KNOWLEDGE.

BY ERWIN F. SMITH.

(*Continued from p. 41.*)

VI.

III. THE POTATO (SOLANUM TUBEROSUM L.)

1. THE GAS-FORMING WET-ROT OF THE TUBERS (1891).

(I) THE DISEASE:

(1) *Author, Title of Paper, Place of Publication, etc.*—This disease was studied by Dr. Ernst Kramer in 1890–91. His paper, entitled (40) *Bakteriologische Untersuchungen über die Nassfäule*